



OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need:

Keyword(s):

Submitting subcommittee(s): **Date Approved:**

(If SAC review identifies additional subcommittees, add them to the box above.)

Background Information:

1. Description of research need:

The OSAC-GEO has drafted a guide for visual color determination of forensic soil samples. This guide is based on well-established methods for soil color characterization in field settings for pedologic applications

Numerous studies have demonstrated the reliability of this method based on repeatability, bias between scientists, and bias between soil color charts. This method has been used for decades in forensic laboratories, and during case verifications.

Forensic samples are sometimes limited in quantity. Research is needed to determine 1) the minimum size requirements for color determination by visual comparison to soil color charts and 2) if there are color biases imparted while characterizing small samples. This study should include representative soils in this evaluation to include organic-rich soils, and mineral-rich soils ranging color.

2. Key bibliographic references relating to this research need:

Draft ASTM Guide: Determination and Comparison of Color by Visual Observation in Forensic Soil Examination

Janssen DW, Ruhf WA, Prichard WW. The use of clay for soil color comparisons. *Journal of Forensic Science*. 1983 Jul 1;28(3):773-6.

Sugita, R and Y. Marumo, 1996, Validity of color examination for forensic soil identification. *Forensic Science International* 83:201-210

Rabenhorst M, Thompson JA, Schmeehling A, Rossi AM. Reliability of Soil Color Standards. *Soil Science Society of America Journal* 2015 Jan; 79(1):193-199. doi:10.2136/sssaj2014.10.0401.

Post, D. F., R.B. Bryant, A.K. Batchily, A.R. Huete, S.J. Levine, M.D. Mays, R. Escadafal 1993. Correlations Between Field and Laboratory Measurements of Soil Color. In: J. M. Bigham, E. J. Ciolkosz, editors, *Soil Color*, SSSA Spec. Publ. 31. SSSA, Madison, WI. p. 35-49. doi:10.2136/sssaspecpub31.c3

Thompson, J. A., A. R. Pollio, and P. J. Turk. 2013. Comparison of Munsell Soil Color Charts and the GLOBE Soil Color Book. *Soil Sci. Soc. Am. J.* 77:2089-2093. doi:10.2136/sssaj2013.03.0117n

Rabenhorst, M.C., M.M. Matovich, A.M. Rossi, and D. E. Fenstermacher. 2014. Visual Assessment and Interpolation of Low Chroma Soil Colors. *Soil Sci. Soc. Am. J.* 78:567-570. doi:10.2136/sssaj2013.08.0347

Sánchez-Marañón, M., Huertas, R. and Melgosa, M., 2005. Colour variation in standard soil-colour charts. *Soil Research*, 43(7), pp.827-837. <https://doi.org/10.1071/SR04169>

Bigham, J. M., and Ciolkosz, E. J., editors, *Soil Color*, Soil Science Society of America Special Publication 31. Soil Science Society of America, Madison, WI, 1993, p 159.

Dudley, R.J., 1975. "The use of colour in the discrimination between soils," *Journal of the Forensic Science Society*, Vol 15, No. 3, pp. 209-218.

Kirillova, N. P., Grauer-Gray, J., Hartemink, A. E., Sileova, T. M., Artemyeva, Z. S. and Burova, E. K., "New perspectives to use Munsell color charts with electronic devices," *Computers and Electronics in Agriculture*, Vol 155, 2018, pp. 378-385.

Marqués-Mateu Á., Moreno-Ramón H., Balasch S., and Ibáñez-Asensio S., "Quantifying the uncertainty of soil colour measurements with Munsell charts using a modified attribute agreement analysis," *Catena*, Vol 1, 2018, pp. 171:44-53.

Shields, J. A., St. Arnaud, R. J., Paul, E. A. and Clayton, J. S., "Measurement of soil color," *Canadian Journal of Soil Science*, Vol 46, No. 1, 1966, pp.83-90.

Cooper, T. H., "Development of students' abilities to match soil color to Munsell color chips," *Journal of Agronomic Education*, Vol 19, No. 2, 1990:141-144.

3a. In what ways would the research results improve current laboratory capabilities?

Virtually all forensic laboratories performing soil examination use color in their examinations processes, and most if not all use visual color determination. A study addressing the size limitation of this method would strengthen existing processes.

3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

A study documenting the size limits for accurate color determination would validate well-established methodologies in soil color determination for forensic sized samples.

3c. In what ways would the research results improve services to the criminal justice system?

The results would bolster a widely accepted method.

4. Status assessment (I, II, III, or IV):

III

	Major gap in current knowledge	Minor gap in current knowledge
No or limited current research is being conducted	I	III
Existing current research is being conducted	II	IV

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.

Approvals:

Subcommittee	Approval date: <input type="text" value="07/12/2019"/>
<i>(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)</i>	

SAC				
1. Does the SAC agree with the research need?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
2. Does the SAC agree with the status assessment?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
If no, what is the status assessment of the SAC:		<input type="text"/>		
Approval date:	<input type="text"/>			
<i>(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)</i>				